

To: Tina Laidlaw/MO/R8/USEPA/US@EPA[]
From: "Mathieus, George"
Sent: Tue 6/26/2012 2:23:51 PM
Subject: FW: Nutrient
[SandW IndVariance v7.1.docx](#)
[CircularDEQ12 v6.3.docx](#)
[Nutrient standards version 7.3.doc](#)
[Post2016 flowchart v4.docx](#)

-----Original Message-----

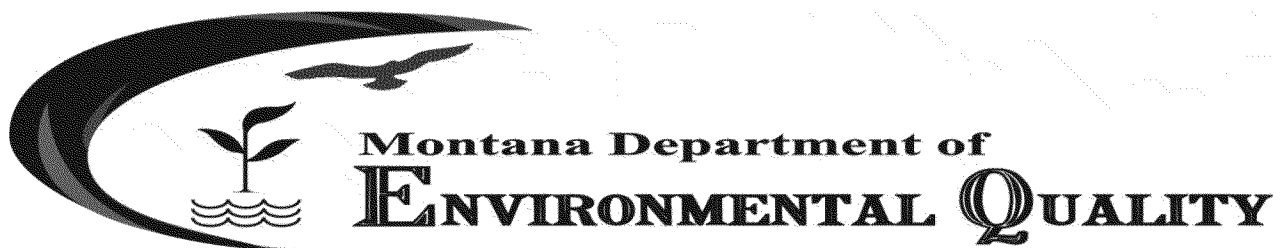
From: Mathieus, George
Sent: Thursday, June 21, 2012 8:25 AM
To: 'Mumford, David'; McInnis, Amanda; Douglas Parker
Subject: Nutrient

Folks.....there is a lot here, but I think everything we discussed fits in one of the attached documents.

The only things I can think of that are not here are significance in TMDLs, and non-deg. We are working on these separately. As we discussed, we already have non-deg rules, but we support collectively developing non-deg that makes more sense for nutrients next.

Please take time to digest and then let's talk on the phone.....

Thanks, George



DRAFT 7.1

Carrying Out a Substantial and Widespread Economic Analysis for Individual Nutrient Standards Variances

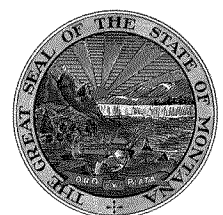
AND

Guidelines for Determining if a Waste Water Treatment Facility Can Remain at a Previous General Variance Concentration

June 2012

Prepared by:

Water Quality Planning Bureau, Water Quality Standards Section
Montana Department of Environmental Quality
1520 E. Sixth Avenue
P.O. Box 200901
Helena, MT 59620-0901



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ACRONYMS

Acronym	Definition
DEQ	Department of Environmental Quality (Montana)
EPA	Environmental Protection Agency (US)
LMI	Low to Moderate Income
MCA	Montana Code Annotated
MHI	Median Household Income

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1.0 INTRODUCTION

Montana law allows for the granting of nutrient standards variances based on the particular economic and financial conditions of a permittee (§75-5-313 [1], MCA). These variances, referred to as individual nutrient standards variances (“individual variances”), may be granted on a case-by-case basis because the attainment of the base numeric nutrient standards is precluded due to economic impacts, limits of technology, or both. Individual variances may only be granted to a permittee after the permittee has made a demonstration to the Department that adverse, significant economic impacts would occur, the limits of technology have been reached, or both, and that there are no reasonable alternatives to discharging into state waters. The Department documents this assessment process here. It was developed in conjunction with the Nutrient Work Group and an earlier, informal working group (the Nutrient Criteria Affordability Advisory Group, which met between September 2008 and April 2009). It is modeled after a U.S. Environmental Protection Agency’s (EPA) process (U.S. Environmental Protection Agency, 1995); however, Montana’s process departs from EPA’s in several substantive ways. This document outlines the specific data requirements, tests, and procedures by which the Department will determine if an individual variance is to be granted (or not) due to the potential for significant and widespread economic impacts.

This document also outlines guidelines for determining when a wastewater treatment facility can remain at the previous general-variance concentration requirements when the Department has updated those requirements per §75-5-313 [7][b], MCA. These guidelines are presented in **Section 4.0** of this document.

2.0 THE EVALUATION PROCESS FOR INDIVIDUAL VARIANCES: PUBLIC-SECTOR PERMITTEES

Methods outlined below are Montana’s modifications to methods presented in U.S. Environmental Protection Agency (1995). If adverse substantial and widespread economic impacts to a community trying to comply with base numeric nutrient standards are demonstrated, the facility upgrade cost-cap will be determined via a sliding scale as proposed by EPA in its September 10, 2010 memo “EPA Guidance on Variances”, reference No. 8EPR-EP.

In taking this approach, the Department has assumed that most permittees who cannot comply with the base numeric nutrient standards (DEQ-12, Part A) would pursue a general variance (DEQ-12, Part B). Therefore, it is only permittees for whom significant economic impacts would occur even at the general variance treatment levels that would likely request individual variances. As such, for communities with secondary scores (discussed further below) of 1.5 or lower, the cost cap for the upgrade would be set at 1.0% of median household income (MHI), including existing wastewater fees. The Nutrient Work Group has indicated that 1.0% of MHI is an acceptable cost cap for a community to expend on wastewater treatment where economic hardship due to meeting base numeric nutrient standards has been demonstrated. Higher Secondary scores would lead to a higher MHI cost cap.

2.1 SUBSTANTIAL AND WIDESPREAD ECONOMIC IMPACTS: PROCESS OVERVIEW

The following is an overview of the steps required to carry out a substantial and widespread economic analysis for a public-sector permittee. The evaluation can be undertaken directly in an Excel spreadsheet

template which contains instructions (see **Section 2.2**). The template is called “PublicEntity_Worksheet_EPACostModel_2012.xlsx” and is available from the Department.

Step 1: Verify project costs and calculate the annual cost of the new pollution control project.

Step 2: Calculate total annualized pollution control cost per household (manifested as an increase in the household wastewater bill).

Steps 3-5: The Substantial Test

Step 3: Calculate and evaluate the Municipal Preliminary Screener score based on the town’s Median Household Income. This step identifies communities that can readily pay for the pollution control project.

Note: If the public entity passes a significant portion of the pollution control costs along to private facilities or firms, then the review procedures outlined in Chapter 3 of EPA (1995) for 'Private Entities' should also be consulted to determine the impact on the private entities.

Step 4: Apply the Secondary Test. This measurement incorporates a characterization of the socio-economic and financial well-being of households in the community. It comprises five evaluation parameters which are then averaged to give the secondary test score for a given community. A secondary score can range from 1.0 to 3.0.

Note: The ability of a community to finance a project may be dependent upon existing household financial conditions within that community.

Step 5: Assess where the community falls in the substantial impacts matrix. This matrix evaluates whether or not a given community is expected to incur substantial economic impacts due to the implementation of the pollution control costs. If the applicant can demonstrate substantial impacts, then the applicant moves on to the widespread test. If the applicant cannot demonstrate substantial impacts, then they will not perform the widespread test; they will be required to meet the base numeric nutrient standards, or may request a general variance if they can discharge at the general variance concentrations defined in Department Circular DEQ-12, Part B.

Note: The evaluation of substantial impacts resulting from compliance with base numeric nutrient standards includes two elements; (1) financial impacts to the public entity as measured in Step 3 (reflected in increased household wastewater fees), and (2) current socio-economic conditions of the community as measured in Step 4. Governments have the authority to levy taxes and distribute pollution control costs among households and businesses according to the tax base. Similarly, sewage authorities charge for services, and thus can recover pollution control costs through user’s fees. In both cases, a substantial impact will usually affect the wider community. Whether or not the community faces substantial impacts depends on both the cost of the pollution control and the general financial and economic health of the community.

Step 6: The Widespread Test

Step 6: If impacts are expected to be substantial, then the applicant goes on to demonstrate whether or not the impacts are expected to be widespread

Note: Estimated changes in socio-economic indicators as a result of pollution control costs will be used to determine whether widespread impacts would occur.

Step 7: Final Determination of Substantial and Widespread Economic Impacts

Step 7: If widespread impacts are also demonstrated, then a permittee is eligible for an individual variance after having demonstrated to the Department that they considered alternatives to discharging (including but not limited to trading, land application, and permit compliance schedules). If widespread impacts have not been demonstrated, then the permittee is not eligible for an individual variance (however, the permittee may still receive a general variance if they can comply with the end-of-pipe treatment requirements thereof).

2.2 COMPLETING THE SUBSTANTIAL AND WIDESPREAD ASSESSMENT SPREADSHEET

Detailed steps for completing the substantial and widespread cost assessment are found in the spreadsheet template “PublicEntity_Worksheet_EPACostModel_2012.xlsx” available from the Department. Readers should refer to that spreadsheet, as it is self explanatory and instructions are found throughout. Below are a few additional details which may help clarify some of the steps:

1. Start at the far left tab of the spreadsheet (“Instructions [Steps to be Taken]”) and review the instructions. They are the same steps outlined in **Section 2.1** above, but in more detail. Proceed to subsequent tabs to the right, making sure not to skip any of worksheets A through F.
2. Summarize the project on Worksheet A.
3. Detail the costs of the project on Worksheet B.
4. Calculated the annual cost per household of existing and expected new water treatment costs on Worksheet C.
5. On Worksheet D, carefully read the text in blue and compare it to the results from the MHI test and the community’s Low to Moderate Income (LMI) level. Based on this screener, the evaluation will either terminate (i.e., it has been shown that the water pollution control is clearly affordable), or will continue to the secondary tests on the next tab which is Worksheet E¹.
6. On Worksheet E, note the linkages to websites and phone numbers where the information requested can be obtained. Then use this information to fill in Worksheet F where a secondary score is calculated.
7. The next tab, ‘Substantial Impacts Matrix’, shows if the community has demonstrated substantial impacts (or not). Those that have clearly demonstrated substantial impacts as well as those that are ‘borderline’ move on to the widespread tests.
8. On the ‘DEQ Widespread Criteria’ tab, complete the four descriptive questions. Then, complete the six primary questions and determine the outcome as to whether impacts are widespread. If still unclear, complete the additional secondary questions and again evaluate.
9. In order to be eligible for an individual variance, both substantial and widespread tests must be satisfied.

¹ The Department appended the LMI test to EPA’s Municipal Preliminary Screener at this step in the process. This was done in order to address communities in which the income distribution is skewed such that there is a large proportion of high- and low-income individuals, but less in the middle near the median household income. As modified, the test should assure that such communities will move on to the more detailed secondary tests.

10. If substantial and widespread impacts are demonstrated, refer to **Section 2.3** below to determine the percentage of median household income that the community is expected to pay towards the pollution control project.

2.3 DETERMINING THE TARGET COST OF THE POLLUTION CONTROL PROJECT

If a permittee has demonstrated that substantial and widespread economic impacts would occur if they were to comply with the base numeric nutrient standards, and there are no reasonable alternatives to discharging, then the cost the permittee will need to expend towards the pollution control project will be based on a sliding scale (**Figure 2-1**). The cost cap is determined as a percentage of the community's MHI, and the key driver of the cost cap is the secondary test (secondary score) calculated in **step 4** of **Section 2.1**.

For example, a community has demonstrated that substantial and widespread economic impacts would occur from trying to comply with the base numeric nutrient standards, and there were no reasonable alternative to discharging. If the permittee's average secondary score from the secondary tests was 1.5, then the annual cost cap for the pollution control project (including current wastewater fees) would be the dollar value equal to 1.0% of the community's MHI at the time that the analysis was undertaken (see blue line, **Figure 2-1**). This 1.0% would include existing wastewater costs plus new upgrades. If this community was already paying 1.0% or greater MHI for its wastewater bill, then no additional monies would be spent (and no additional upgrades would occur) under the individual variance.

The percentage of a community's MHI—as determined by the 'sliding scale' in **Figure 2-1**—would translate to the final wastewater bill that the community would pay after the upgrade. For example, a community with 10,000 households has a MHI of \$40,000/year, and the sliding scale table indicates that 1.0% MHI needs to be expended on the pollution control project. To receive the individual variance, the per-household wastewater bill for the community would need to become, on average, \$400 per year (\$33.33 per month), because \$400 is 1% of MHI in that community. If the average household in this community currently has a wastewater bill that is \$300 per year (\$25.00 per month), then a bill increase of \$100 per year per household on average would be warranted to reach \$400 per year or 1% MHI. Multiplying \$100/year in an increased wastewater bill by the number of households on the system (10,000) provides the total annual dollar value available to be expended towards construction, operations, and maintenance of the wastewater upgrade. In this hypothetical case, that amounts to \$1 million (10,000 X \$100) that could be spent per year on an upgrade project. The upgrade itself may be significantly more than \$1 million in initial capital costs, but the annualized payback of capital costs plus O&M costs of the upgrade could not be more than \$1 million per year. If the current wastewater bill of this town was already \$400 or higher, then no additional change would be expected (i.e., no further system upgrade would be required).

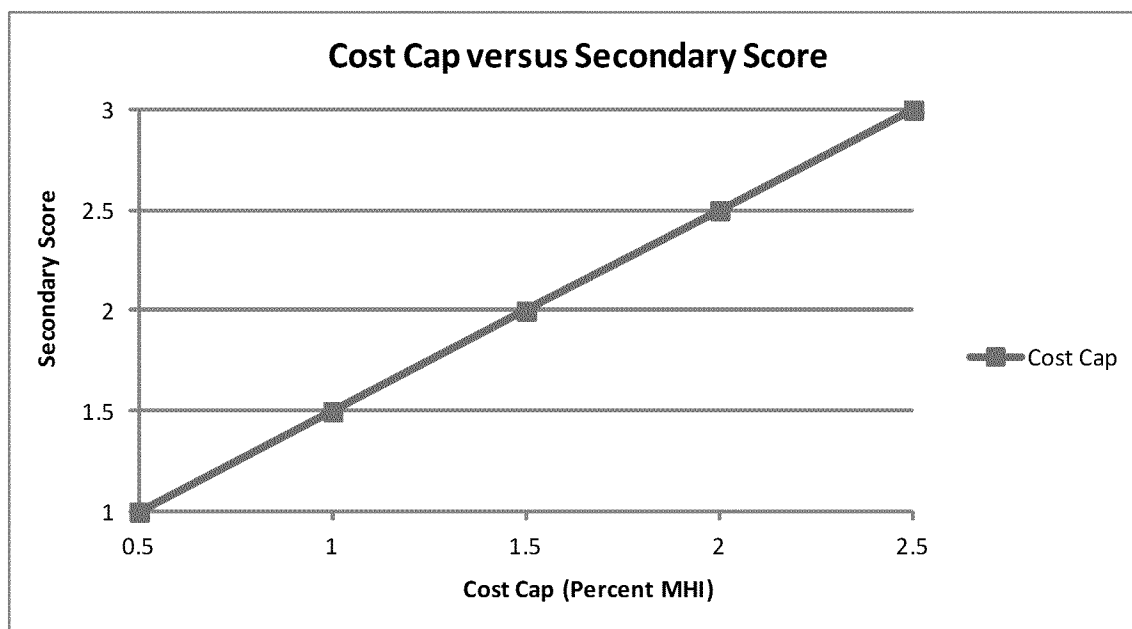


Figure 2-1. Sliding scale for determining cost cap based on a community's secondary score.

The horizontal axis represents percentages of a community's median household income (MHI) that the community would be expected to expend towards the pollution control project as a function of the secondary score shown on the vertical axis.

It should be noted that the final cost of the engineering project may not exactly match the dollar value associated with the percent MHI determined via **Figure 2-1** (i.e., the actual project cost could be somewhat lower or somewhat higher than the dollar value equivalent for the percent MHI of the community in question). Engineers should view the dollar value equivalent of the MHI derived from **Figure 2-1** as a target, to help select the most appropriate water pollution control solution for the community. In order to accommodate actual engineering costs for the project, the Department will provide flexibility around the dollar value arrived at via **Figure 2-1**, subject to final Department approval.

When the level of treatment required has been established and accepted by the Department, it will be adopted by the Department following the Department's formal rule making process and documented in Circular DEQ-12, Part B.

3.0 THE EVALUATION PROCESS FOR INDIVIDUAL VARIANCES: PRIVATE-SECTOR PERMITTEES

Methods outlined below are almost identical to those presented in U.S. Environmental Protection Agency (1995). If adverse substantial and widespread economic impacts to a private entity trying to comply with nutrient standards are demonstrated, the facility upgrade will be determined via approaches discussed in **Section 3.3**.

3.1 SUBSTANTIAL AND WIDESPREAD ECONOMIC IMPACTS: PROCESS OVERVIEW

The following is an overview of the steps required to carry out a substantial and widespread economic

analysis for a private-sector permittee. The evaluation can be undertaken directly in an Excel spreadsheet template which contains instructions (see **Section 3.2**). The template is called “PrivateEntity_Worksheet_EPACostModel_2012.xlsx” and is available from the Department.

Step 1: Verify Project Costs and Calculate the Annual Cost of the Pollution control project to the private entity.

Step 2: Substantial Test. Run a financial impact analysis on the private entity to assess the extent to which existing or planned activities and/or employment will be reduced as a result of meeting the water quality standards. The primary measure of whether substantial impact will occur to the private entity is profitability. The secondary measures include indicators of liquidity, solvency, and leverage.

Step 3: Widespread Test. If impacts on the private entity are expected to be substantial, then the applicant goes on to demonstrate whether they are also expected to be **widespread** to the defined study area.

Note: Estimated changes in socio-economic indicators in a defined area as a result of the additional pollution costs will be used to determine whether widespread impacts would occur.

Step 4: Final Determination of Substantial and Widespread Economic Impacts. If both substantial and widespread impacts are demonstrated, then a permittee is eligible for an individual variance after having demonstrated to the Department that they considered alternatives to discharging (including but not limited to trading, land application, and permit compliance schedules). If widespread impacts have not been demonstrated, then the permittee is not eligible for an individual variance (however, the permittee may still receive a general variance if they can comply with the end-of-pipe treatment requirements thereof).

3.2 COMPLETING THE SUBSTANTIAL AND WIDESPREAD ASSESSMENT SPREADSHEET

Detailed steps for completing the substantial and widespread cost assessment are found in the spreadsheet template “PrivateEntity_Worksheet_EPACostModel_2012.xlsx” (available from the Department). Readers should refer to that spreadsheet, as it is self explanatory and instructions are found throughout. Detailed steps for private sector entities are also found in Chapter 3 of U.S. Environmental Protection Agency (1995). Below are a few additional details which may help clarify some of the steps:

1. Start at the far left tab of the spreadsheet (“Instructions [Steps to Take]”) and review the instructions. They are the same steps outlined in **Section 3.1** above. Proceed to subsequent tabs to the right, making sure not to skip any of the worksheets.
2. Summarize the project on Worksheet A.
3. There are no worksheets B through F on the private test.
4. The next worksheet is G where one details the costs of the project.
5. In the next tab, carefully read the ‘Substantial Impact Instructions’.
6. In worksheets H through L, the four main substantial tests are presented. For these tests, profit and solvency ratios are calculated with and without the additional compliance costs (taking into consideration the entity's ability to increase its prices to cover part or all of the costs). Comparing these ratios to each other and to industry benchmarks provides a measure of the

impact on the entity of additional wastewater costs. For profit and solvency, the main question is how these will be affected by additional pollution control costs. The Liquidity and leverage measures look at how a firm is doing right now financially, and how much additional financial burden they could take on.

7. In the Tab entitled "Substan.Impacts_Determined", instruction is given as to how to interpret the results from the 'Substantial' tests in worksheets H through L.
8. If a 'Substantial' finding is made, then proceed on to the next tab. If it is not made, then a variance will not be given.
9. On the 'DEQ Widespread Criteria' tab, complete the descriptive questions. Then, complete the primary questions and determine the outcome as to whether impacts are widespread. If still unclear, complete the secondary questions and again evaluate.
10. In order to be eligible for an individual variance, both substantial and widespread tests must be satisfied.
11. If both substantial and widespread impacts are demonstrated from additional pollution control costs, see **Section 3.3** below.

3.3 COST-CAP (OR OTHER SOLUTION) FOR PRIVATE ENTITIES

U.S. Environmental Protection Agency (1995) provides very little guidance as to what financial expenditure should be made towards water pollution control when a private firm has demonstrated substantial and widespread impacts would occur if they complied with the standards. U.S. Environmental Protection Agency (1995) only states that "...if substantial and widespread economic and social impacts have been demonstrated, then the discharger will not have to meet the water quality standards. The discharger will, however, be expected to undertake some additional pollution control."

In cases where substantial and widespread economic impact has been demonstrated per methods outlined here in **Section 3.0**, the Department expects that in most cases the discharger (and their engineers) will propose to the Department some level of effluent improvement beyond that which they are currently doing, but less stringent than the general variances concentrations (which are now in statute at §75-5-313, MCA, and which will later be adopted as Department rules in 2016). A likely scenario would be that the discharger could implement a treatment technology one level less sophisticated than that required to meet the general variance concentrations. Basic definitions for different treatment levels are found in Falk et al. (2011); through 2016 the general variance requirement for dischargers > 1 MGD corresponds to level 2. When the discharger and the Department have come to agreement on the level of treatment required, the treatment levels will be adopted by the Department following the Department's formal rule making process, and documented in Circular DEQ-12, Part B.

4.0 GUIDELINES FOR DETERMINING IF A WASTEWATER TREATMENT FACILITY CAN REMAIN AT THE PREVIOUS GENERAL VARIANCE

CONCENTRATION(S)

The Department is required to review, and update as needed, the treatment requirements associated with the three general variance categories found at §75-5-313[5][b], MCA. The main principle that the Department must use to update (i.e., make more stringent) the statute-defined concentrations is that more cost effective and efficient treatment technologies have become available (§75-5-313 [7][b], MCA). The Department will carry out the determinations every 3 years as part of the water quality standards triennial review, and will update the category concentrations and requirements if more cost effective and efficient treatment technologies, relative to 2011, are available. However, circumstances may arise where, for a specific discharger, it may not make sense to move to the new, lower general variance concentration(s) at the time they are updated by the Department.

In order to remain at a previous general variance concentration, a permittee will need to demonstrate to the Department that (1) moving to the updated general variance concentration would not result in a net environmental improvement or material progress towards attaining the standards, and (2) it would cause more environmental damage than it would remedy². The second of these conditions is essentially a determination of “net environmental benefit”. The purpose of this section is to provide guidelines for the types of information the Department would need to permit a discharger to remain at the previous general-variance treatment levels, based on the two sets of conditions listed.

4.1 METHODS FOR DEMONSTRATING INSIGNIFICANT ENVIRONMENTAL IMPROVEMENT/PROGRESS TOWARDS ATTAINING THE STANDARD

Two major approaches may be used to establish that upgrading a wastewater facility to an updated general variance level would not result in significant environmental improvement or material progress towards attaining the standard:

1. Simulations based on mechanistic computer models
2. Demonstration of use support based on empirical data

Simulation Based on Mechanistic Computer Models. The Department will consider mechanistic model results that demonstrate that the lowering of one nutrient (e.g., TP) without lowering of the other would achieve essentially the same water quality endpoint (i.e., equivalent movement towards the water quality goal), subject to Department approval of the model and the model’s parameterization. Modeled endpoints may include changes in water quality (pH, dissolved oxygen, etc.), and benthic and phytoplankton algae density. The Department encourages the use of the QUAL2K model (Chapra et al., 2010) but may consider results from other water quality models as well. Modeled nutrient reduction

² NEW RULE I (6) states: “A permittee who has already received a general variance is not required to further treat the facility’s discharge to an updated (lower) general variance concentration adopted by the department if it can be demonstrated that achieving the lower concentration would not result in net environmental improvement, or would not result in material progress towards attaining the base numeric nutrient standard, and would cause more environmental harm than remaining at the previous general variance concentration.” This corresponds to laws at the federal level governing the granting of variances from water quality standards. 40 CFR 313 (10)(g)(3) states that “Human caused conditions or sources of pollution...would cause more environmental damage to correct than to leave in place”.

scenarios can vary in each case, but scenarios based on the five treatment levels described in Falk et al. (2011)—which represent steps in biological nutrient removal technologies—are encouraged by the Department.

The state of the art in computer water quality/algal growth modeling is such that nutrient co-limitation and community interaction of river flora is poorly simulated (or is not simulated at all). Models often treat algal growth dynamics in streams and rivers as though the algae were a monoculture (which is not the case). Because of the uncertainties in model simulations, the Department will require specific monitoring (per NEW RULE I [6][a]) for dischargers that are permitted to remain at a previous general variance concentration based on a mechanistic computer model output. The intent of the monitoring is to corroborate (or refute) the computer simulated results. At a minimum, growing season benthic-algae sampling will be required for a reach of the river downstream of the permittee's mixing zone, to be established in coordination with the Department. If the base numeric nutrient standard for the river in question was developed based on another water quality endpoint (for example, pH), then data collection must also include that parameter. Data collection will follow Department SOPs. If the collected data and the computer modeling results corroborate one another, then a reach-specific base numeric nutrient standard may be in order. Any reach-specific nutrient standard so determined may be adopted by the Board of Environmental Review under its rulemaking authority in §75-5-301(2), MCA.

Demonstration of Use Support Based on Empirical Data. Permittees may begin at any time to collect nutrient concentration, benthic and phytoplankton algae, and other water quality data in the receiving waterbody downstream of their mixing zone. In cases where the base numeric nutrient standard for the waterbody were developed using a specific water quality endpoint (for example, pH), data collection must include that parameter. Data collection shall follow Department SOPs. Permittees are strongly encouraged to coordinate with the Department on study design and data collection protocols upfront, to assure that the data will be acceptable to the Department when the time comes for evaluating the outcomes. Subject to Department approval, these data may be used to demonstrate that remaining at the previous general-variance treatment level (assumed here to have been achieved by the permittee) was adequate to support beneficial uses of the waterbody. If the collected data conclusively indicate that beneficial uses of the waterbody are fully supported, then a reach-specific base numeric nutrient standard may be in order. Any reach-specific nutrient standard so determined may be adopted by the Board of Environmental Review under its rulemaking authority in §75-5-301(2), MCA.

4.2. NET ENVIRONMENTAL BENEFIT

NEW RULE I (6) requires that, in order for a permittee to remain at a previous general variance treatment level, a demonstration must be made that (1) an upgrade to the new general variance concentration would not result in net environmental improvement and (2) would cause more environmental harm than remaining at the previous treatment level. Per (2), the Department does not want to see substantive contributions to one form of pollution (air, noise, greenhouse gases, etc.) resulting from actions to address water pollution if those actions may only minimally reduce the water pollution problem in question. This section addresses the requirements associated with the later requirement.

Permittees must provide the Department approximate estimates of the capital costs, and operations and maintenance costs, which would have been required in order to upgrade the facility to the new general variance concentrations. The intent is to demonstrate that there were substantial savings in capital costs, materials, fuel, and energy by opting *not* to upgrade the facility. Capital costs saved would

not include design-related work and overhead. Operations and maintenance cost saved should be estimates of fuel and/or electrical consumption, and other materials (e.g., chemicals). Permittees are not required to carry out a complex analysis comparing the relative economic or social value of one resource (the stream or river) vs. another (e.g., air quality) and then trying to quantify the relative savings. Rather, the Department wants a straight-forward quantification of cost savings associated with the key factors of concern (fuel and electrical consumption, and routine materials such as chemical additions).

5.0 REFERENCES

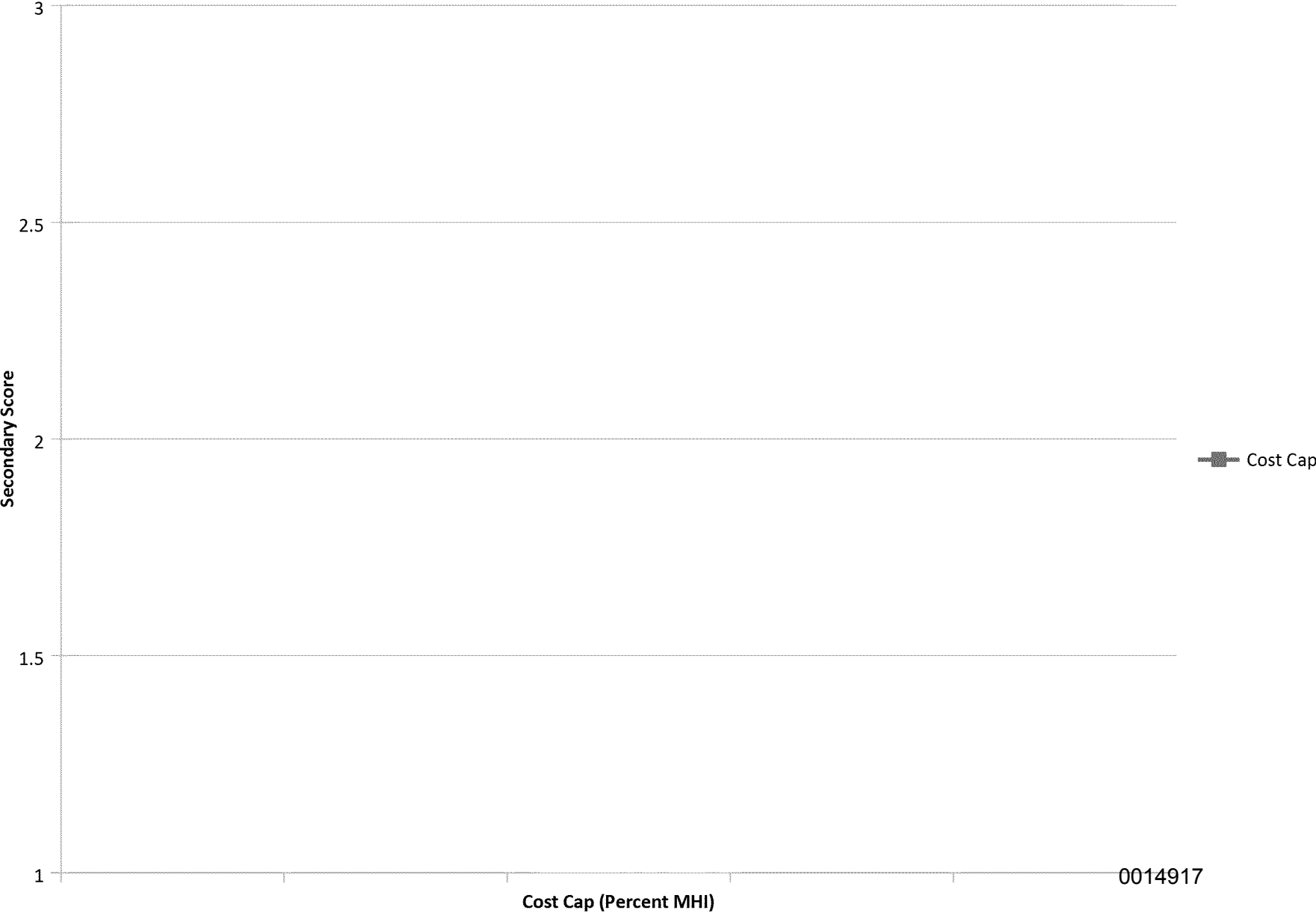
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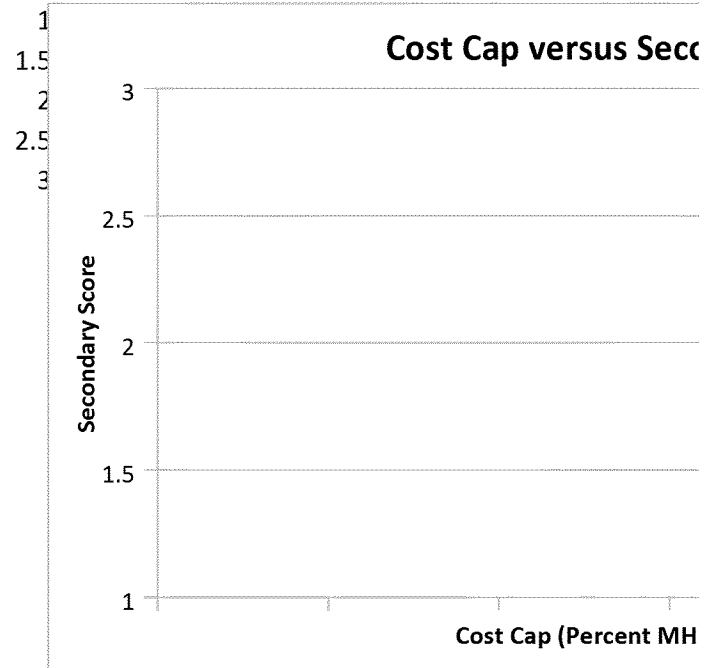
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Cost Cap versus Secondary Score



Secondary score

Percent MHI



Secondary Score

■ Cost Cap

l)



DEPARTMENT CIRCULAR

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DEQ-12, PARTS A and B

**Montana Base Numeric Nutrient Standards
and Nutrient Standards Variances**

GENERAL INTRODUCTION

This circular contains information pertaining to the base numeric nutrients standards (§75-5-103[2], MCA) and their implementation. It is divided into **Parts A** and **B**. **Part A** contains the water quality standards including concentration limits, where they apply, and their period of application. **Part A** is adopted by the Board of Environmental Review under its rulemaking authority in §75-5-301(2), MCA.

Part B contains information about variances from the base numeric nutrient standards. This includes effluent treatment requirements associated with general nutrient standards variances, as well as effluent treatment requirements for individual nutrient standards variances and to whom these apply. **Part B** also contains the Department's definition of the total nitrogen (TN) and total phosphorus (TP) concentrations achievable at the limits of technology. Unlike **Part A**, **Part B** is not adopted by the Board of Environmental Review; **Part B** is adopted by the Department following its formal rule making process, pursuant to §75-5-313, MCA.

The Department has reviewed a considerable amount of scientific literature and has carried out scientific research on its own in order to derive the base numeric nutrient standards (see **References** in **Part A**). Because many of the base numeric nutrient standards are stringent and may be difficult for MPDES permit holders to meet in the short term, Montana's legislature adopted laws (e.g., §75-5-313, MCA) allowing for the achievement of the standards over time via the variance procedures in **Part B**. This approach should allow time for nitrogen and phosphorus removal technologies to improve and become less costly, and to allow time for nonpoint sources of nitrogen and phosphorus pollution to be better addressed.

Circular DEQ-12, PART A

SEPTEMBER 2012 EDITION

1.0 Introduction

Elements comprising Circular DEQ-12, **Part A** are found below. These elements are adopted by the Montana Board of Environmental Review. The nitrogen and phosphorus concentrations provided here have been set at levels that will protect beneficial uses, and prevent exceedences of other surface water quality standards which are commonly linked to nitrogen and phosphorus concentrations (e.g., dissolved oxygen; see Circular DEQ-7 for the dissolved oxygen standards). The nitrogen and phosphorus concentrations also reflect the intent of the narrative standard at ARM 17.30.637(1)(e), and will preclude the need for case-by-case interpretations of that narrative standard.

1.1 Definitions

1. **Ecoregion** means mapped regions of relative homogeneity in ecological systems, derived from perceived patterns of a combination of causal and integrative factors including land use, land surface form, potential natural vegetation, soils, and geology. See also, endnote 1.
2. **Large river** means a perennial waterbody which has, during summer and fall baseflow (August 1 to October 31 each year), a wadeability index (product of river depth [in feet] and mean velocity [in ft/sec]) of 7.24 ft²/sec or greater, a depth of 3.15 ft or greater, or a baseflow annual discharge of 1,500 ft³/sec or greater. See also, endnote 5.
3. **Total nitrogen** means the sum of all nitrate, nitrite, ammonia, and organic nitrogen, as N, in an unfiltered water sample. Total nitrogen in a sample may also be determined via persulfate digestion, or as the sum of total kjeldahl nitrogen plus nitrate plus nitrite.
4. **Total phosphorus** means the sum of orthophosphates, polyphosphates, and organically bound phosphates, as P, in an unfiltered water sample. Total phosphorus may also be determined directly by persulfate digestion.
5. **Wadeable stream** means a perennial or intermittent stream in which most of the wetted channel is safely wadeable by a person during baseflow conditions.

2.0 Base Numeric Nutrient Standards

Table 12A-1 below shows the base numeric nutrient standards for Montana's wadeable streams and large rivers. Details on how these standards were derived can be found mainly in Addendum 1 of Suplee et al. (2008). In **Table 12A-1** nutrient standards for wadeable streams are sub-grouped by ecoregion, either at level III (coarse scale) or level IV (fine scale). Following the ecoregional standards is a list of wadeable streams with reach-specific standards; these waterbodies have characteristics dissimilar from those of the ecoregions in which they reside and have therefore been provided reach-specific values.

For the wadeable streams, the standards should be applied in this order: reach specific (if applicable) then level IV ecoregion (if applicable) then level III ecoregion. **Table 12A-1** also contains a list of large river segments for which base numeric nutrient standards have been developed.

Table 12A-2 is a placeholder table for base numeric nutrient standards that may be adopted for Montana's lakes and reservoirs.

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Table 12A-1. Base Numeric Nutrient Standards for Wadeable Streams in Different Montana Ecoregions, and Base Numeric Nutrient Standards for Individual Wadeable-stream and Large-river Reaches. Related assessment information is also shown.

Standards for individual Wadeable-stream and Large-river Reaches. Related assessment information is also shown.				
Ecoregion ^{1,2} (level III or IV) and Number, or Individual Reach Description	Period When Criteria Apply	Numeric Nutrient Standard ³		Related Assessment Information ⁴
		Total Phosphorus (µg/L)	Total Nitrogen (µg/L)	
ECOREGION (level III or IV):				
Northern Rockies (15)	July 1 to September 30	30	300	125 mg Chla /m ² and 35 g AFDM/m ²
Canadian Rockies (41)	July 1 to September 30	25	350	125 mg Chla /m ² and 35 g AFDM/m ²
Idaho Batholith (16)	July 1 to September 30	30	300	125 mg Chla /m ² and 35 g AFDM/m ²
Middle Rockies (17)	July 1 to September 30	30	300	125 mg Chla /m ² and 35 g AFDM/m ²
Absaroka-Gallatin Volcanic Mountains (17i)	July 1 to September 30	105	250	125 mg Chla /m ² and 35 g AFDM/m ²
Northwestern Glaciated Plains (42)	June 16 to September 30	110	1400	
Sweetgrass Upland (42l), Milk River Pothole Upland (42n), Rocky Mountain Front Foothill Potholes (42q), and Foothill Grassland (42r)	July 1 to September 30	80	560	165 mg Chla /m ² and 70 g AFDM/m ²
Northwestern Great Plains (43) and Wyoming Basin (18)	July 1 to September 30	140	1400	
River Breaks (43c)	NONE RECOMMENDED	NONE RECOMMENDED	NONE RECOMMENDED	
Non-calcareous Foothill Grassland (43s), Shields-Smith Valleys (43t), Limy Foothill Grassland (43u), Pryor-Bighorn Foothills (43v), and Unglaciated Montana High Plains (43o)*	July 1 to September 30	33	440	125 mg Chla /m ² and 35 g AFDM/m ²
INDIVIDUAL REACHES (Wadeable Streams):				
Flint Creek, from Georgetown Lake outlet to the ecoregion 17ak boundary (46.4002, -113.3055)	July 1 to September 30	72	500	150 mg Chla /m ² and 45 g AFDM/m ²
Bozeman Creek, from headwaters to Forest Service Boundary (45.5833, -111.0184)	July 1 to September 30	105	250	125 mg Chla /m ² and 35 g AFDM/m ²
Bozeman Creek, from Forest Service Boundary (45.5833, -111.0184) to mouth at East Gallatin River	July 1 to September 30	76	270	125 mg Chla /m ² and 35 g AFDM/m ²
Hyalite Creek, from headwaters to Forest Service Boundary (45.5833, -111.0835)	July 1 to September 30	105	250	125 mg Chla /m ² and 35 g AFDM/m ²
Hyalalite Creek, from Forest Service Boundary (45.5833, -111.0835) to mouth at East Gallatin River	July 1 to September 30	90	260	125 mg Chla /m ² and 35 g AFDM/m ²
East Gallatin River between Bozeman Creek and Bridger Creek confluences	July 1 to September 30	50	290	125 mg Chla /m ² and 35 g AFDM/m ²
East Gallatin River between Bridger Creek and Hyalite Creek confluences	July 1 to September 30	30	300	125 mg Chla /m ² and 35 g AFDM/m ²
East Gallatin River from Hyalite Creek confluence to the mouth (Gallatin River)	July 1 to September 30	60	290	125 mg Chla /m ² and 35 g AFDM/m ²
Clark Fork River from below the Warm Springs Creek confluence (46.1881, -112.7680) to the Bitterroot River confluence	July 1 to September 30	20	300	100 mg Chla /m ² (summer mean); 150 mg Chla /m ² (summer maximum)
INDIVIDUAL REACHES (Large Rivers ⁵):				
Clark Fork River from the Bitterroot River confluence to the Flathead River confluence	July 1 to September 30	24	300	100 mg Chla /m ² (summer mean); 150 mg Chla /m ² (summer maximum)
Yellowstone River (Bighorn River confluence to Powder River confluence)	August 1 -October 31	90	700	
Yellowstone River (Powder River confluence to stateline)	August 1 -October 31	140	1000	

*For the Unglaciated High Plains ecoregion (43o), criteria only apply to the polygon located just south of Great Falls, MT.

¹ See endnote 1

² See endnote 2

³ See endnote 3

⁴ See endnote 4

⁵ See endnote 5

12A-2. Table of Base Numeric Nutrient Standards for Lakes and Reservoirs that May be Adopted.

		Numeric Nutrient Standard ⁶		
Ecoregion ¹ (level III or IV) and Number, or Individual Lake or Reservoir Description	Period of Application	Total P (µg/L)	Total N (µg/L)	Related Assessment Information
<i>LAKES/RESERVOIRS by ecoregion:</i>				
Middle Rockies (17)	Year-round	[]	[]	Phytoplankton [] µg Chl <i>a</i> /l and Secchi depth [] m
Northern Rockies (15)	Year-round	[]	[]	Phytoplankton [] µg Chl <i>a</i> /l and Secchi depth [] m
Canadian Rockies (41)	Year-round	[]	[]	Phytoplankton [] µg Chl <i>a</i> /l and Secchi depth [] m
Idaho Batholith (16)	Year-round	[]	[]	Phytoplankton [] µg Chl <i>a</i> /l and Secchi depth [] m
<i>LAKE SPECIFIC CRITERIA:</i>				
	Year-round	[]	[]	Phytoplankton [] µg Chl <i>a</i> /l and Secchi depth [] m
<i>RESERVOIR SPECIFIC CRITERIA:</i>				
	Year-round	[]	[]	Phytoplankton [] µg Chl <i>a</i> /l and Secchi depth [] m

¹ See endnote 1⁶ See endnote 6

2.1 Required Reporting Values for Base Numeric Nutrient Standards

Table 12A-3 presents the required reporting values for total phosphorus and total nitrogen measurements used to conform with the base numeric nutrient standards in this circular.

Table 12A-3. Required reporting values^{a,b} for total nitrogen and phosphorus measurements.

Nutrient		Method of Measurement	Required Reporting Value
Total phosphorus		Persulfate digestion	3 µg/L
Total nitrogen		Persulfate digestion	70 µg/L
Total nitrogen	Sum of:	(a) total kjeldahl nitrogen	150 µg/L
		(b) nitrate + nitrite	See RRVs below
Nitrate- as N			20 µg/L
Nitrite- as N			10 µg/L
Nitrate + Nitrite-as N			20 µg/L

^a See definition for required reporting values found in footnote 19 of Department Circular DEQ-7.^b Concentrations in Table 12A-3 must be achieved unless otherwise specified in a permit, approval, or authorization issued by the Department (DEQ-7; ARM 17.30.702).

2.2 Developing Permit Limits for Base Numeric Nutrient Standards

For total nitrogen and total phosphorus, the critical low-flow for the design of disposal systems shall be based on the seasonal 14Q5 of the receiving water (see ARM 17.30.635[4]). When developing permit limits for base numeric nutrient standards, the Department will use an average monthly limit (AML) only, using methods appropriate for criterion continuous concentrations (i.e., chronic concentrations). Permit limits will be established using a value corresponding to the 95th percentile probability distribution of the effluent. The Department shall use methods that are appropriate for criterion continuous concentrations which are found in the document “*Technical Support Document for Water Quality-based Toxics Control*”, Document No. EPA/505/2-90-001, United States Environmental Protection Agency, 1991.

3.0 Endnotes

(1) Ecoregions are based on the 2009 version (version 2) of the U.S. Environmental Protection Agency maps. These can be found at: http://www.epa.gov/wed/pages/ecoregions/mt_eco.htm . For Geographic Information System (GIS) use within DEQ, the GIS layers may be found at: L:\DEQ\Layers\Ecoregions.lyr

(2) Within and among the geographic regions or watersheds listed, base numeric nutrient standards of the downstream reaches, or other downstream waterbodies, must continue to be maintained.

(3) The 30 day (monthly) average concentration of these parameters may not be exceeded more than once in any five year period, on average.

(4) Related assessment information comprises water quality variables affected by nitrogen and phosphorus concentrations and includes parameters such as dissolved oxygen, pH, and algal density. Values shown refer to bottom-attached (benthic) algae density quantified as chlorophyll *a* (Chl*a*) or ash free dry mass (AFDM) per square meter of stream bottom. The values are the arithmetic mean of ≥ 10 replicate measures of benthic algae collected in the wadeable zone (water depths ≤ 1 m) from a site during a sampling event. A site is a reach of a stream ≥ 100 m long but < 500 m long or, for some larger streams and for large rivers, may be a transect perpendicular to flow. Algae replicates must be collected in the wadeable zone of streams and rivers using a randomized approach or other, unbiased systematic approaches. Chl*a* and AFDM are used to assess the biomass of algae accumulated on the stream bottom; algae is stimulated by excess nitrogen and phosphorus levels and is associated with (for example) impacts to recreational uses and impacts to stream dissolved oxygen levels.

For the Clark Fork River, the maximum summer algae value is the single greatest of any of the monthly mean Chl*a* values at a given site. Therefore, there is only one month each summer representing the maximum. The summer mean is the arithmetic mean of the set of all benthic algae replicates collected at a site during a given summer.

(5) **Table E-4** below shows the beginning and ending locations for large rivers in Montana.

Table E-4. Large river segments within the state of Montana.

River Name	Segment Description
Big Horn River	Yellowtail Dam to mouth
Clark Fork River	Bitterroot River to state-line
Flathead River	Origin to mouth
Kootenai River	Libby Dam to state-line
Madison River	Ennis Lake to mouth
Missouri River	Origin to state-line
South Fork Flathead River	Hungry Horse Dam to mouth
Yellowstone River	State-line to state-line

(6) No lake or reservoir referenced in **Table 12A-2** shall have an average concentration that exceeds the values shown based upon a monthly (30-day) period. The Department will determine on a case-by-case basis whether or not a permitted discharge to a stream or river is likely to be impacting a downstream lake or reservoir. If yes, the permittee would be expected to meet its average monthly limit year round.

4.0 References

The following are citations for key scientific and technical literature used to derive the base numeric nutrient standards. This is not a complete list; rather, it contains the most pertinent citations. Many other articles and reports were reviewed during the development of the standards.

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- Suplee, M.W., V. Watson, A. Varghese, and J. Cleland, 2008. Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers, **and Addendums**. Helena, MT: Montana Department of Environmental Quality, 86 p.
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Circular DEQ-12, PART B

SEPTEMBER 2012 EDITION

1.0 Introduction

Elements comprising Circular DEQ-12, **Part B** are found below. These elements are adopted by the Department following the Department's formal rule making process. Montana state law (§75-5-103 [22], MCA and 75-5-313, MCA) allows for variances from the base numeric nutrient standards (found in **Part A** of this circular) based on a determination that base numeric nutrient standards cannot be achieved because of economic impacts or because of the limits of technology.

1.1 Definitions

1. **Limits of technology** means wastewater treatment processes for the removal of nitrogen and phosphorus compounds from wastewater that can consistently achieve a concentration of 70 µg TP/L and 4,000 µg TN/L.
2. **Long-term average** means a description of effluent data from a treatment system using standard descriptive statistics and an assumption that the data follow a lognormal distribution. See also, "*Technical Support Document for Water Quality-based Toxics Control*", Document No. EPA/505/2-90-001, United States Environmental Protection Agency, 1991.

2.0 General Nutrient Standards Variances

Because the treatment of wastewater to base numeric nutrient standards in 2011 would have resulted in substantial and widespread economic impacts on a statewide basis (§75-5 -313 [5][a], MCA), a permittee who meets the end-of-pipe treatment requirements provided below in **Table 12B-1** may apply for and may be granted a general nutrient standards variance ("general variance") (§75-5 -313 [5][b], MCA). A person may apply for a general variance for either total phosphorus or total nitrogen, or both. The general variance may be established for a period not to exceed 20 years. A compliance schedule to meet the treatment requirements shown in **Table 12B-1** may be granted on a case-by-case basis.

Cases will arise in which a permittee is or will be discharging effluent with N and/or P concentrations lower than (i.e., better than) the minimum requirements of a general variance. And yet, the resulting concentrations outside of the mixing zone still exceed the base numeric nutrient standards. Such discharges are still within the scope of the general variance, because statute indicates that a general variance is allowable if the permittee treats the discharge to, **at a minimum**, the concentrations indicated by §75-5-313(5)(b)(i) and (ii), MCA. Thus, permitted discharges better than those at §75-5-313(5)(b)(i) and (ii), MCA are not precluded from falling under a general variance.

Table 12B-1. General variance end-of-pipe treatment requirements per §MCA 75-5 -313(5)(b), through May 2016.

Discharger Category ¹	Long-term Average	
	Total P (µg/L)	Total N (µg/L)
≥ 1.0 million gallons per day	1,000	10,000
< 1.0 million gallons per day	2,000	15,000
Lagoons not designed to actively remove nutrients	Maintain current performance	Maintain current performance

¹ See endnote 1

The Department must review the general variance treatment requirements every 3 years to assure that the justification for their adoption remains valid. The purpose of the review is to determine whether there is new information that supports modifying (e.g., revising the interim effluent treatment requirements) or deleting the variance. If a low-cost technological innovation for lowering nitrogen and phosphorus concentrations in effluent were to be developed in the near future, for example, the Department could (after May 2016) make more stringent the concentrations shown in the table. If the Department were to adopt general variance treatment requirements more stringent than those provided in **Table 12B-1**, revised effluent limits will be included with the permit during the next permit cycle, unless the demonstration discussed in **Section 2.2** below is made. A compliance schedule may also be granted to provide time to achieve compliance with revised effluent limits.

Only after changes in specified factors have occurred would the general variance treatment requirements be made more stringent. The review will occur triennially and will be carried out at a fairly coarse level (i.e., statewide). The Department and the Nutrient Work Group will consider various factors such as:

1. Whether more cost-effective, efficient, and innovative nutrient removal technologies are available.
2. Whether Montana's economic status had changed sufficiently to make nutrient removal more affordable. If new technologies (per 1 above) have not become widely available, the Department will estimate on a statewide basis the cost for facilities within a category (per §75-5-313(5)(b)(i) and (ii), MCA) to move to the next more stringent nutrient treatment level. Different levels of nutrient removal and achievability are defined in Falk et al. (2011)¹.
3. Whether development of permit limits for base numeric nutrient standards should be revised to reflect N- or P-compound speciation and bioavailability.

¹ See Endnote 2.

2.1 Wastewater Facility Optimization Study

Permittees receiving a general variance are required to evaluate current facility operations to optimize nutrient reduction with existing infrastructure and shall analyze cost-effective methods of reducing nutrient loading, including but not limited to nutrient trading without substantial investment in new infrastructure (§75-5-313[9][a], MCA). The Department encourages permittees to examine a full array of reasonable options including (but not limited to) reuse, recharge, and land application. The Department may request the results of the optimization/nutrient reduction analysis within two years of granting a general variance to a permittee.

Changes to facility operations resulting from the analysis carried out per the above paragraph are only intended to be refinements to the system already in place. Therefore, optimizations:

1. Should only address changes to facility operation and maintenance and should not be structural changes
2. Should not result in rate increases
3. Must include exploration of the feasibility of nutrient trading within the watershed

Who and how the analysis is carried out can be decided by the permittee. The Department encourages the use of a third-party firm with expertise in this subject.

2.2 Option for Remaining at a Previous General Variance Long-term Average

In some cases, upgrading a wastewater facility to a more stringent general variance concentration adopted by the department may not result in a net environmental benefit in the receiving waterbody or material progress towards attaining the standard, and would result in more environmental harm than remaining at the previous general-variance concentration. If such a case can be demonstrated to the satisfaction of the Department, then a permittee will not be required at that time to upgrade the wastewater facility to meet the new general variance concentration (ARM 17.30.XXX). The permittee will, however, be required to provide monitoring water-quality data that can be used to determine if the justifications for forgoing the upgrade continue to hold true. Details on the requirements for making the demonstration and for collecting the monitoring data are provided in the Department guidance document *“Carrying out a Substantial and Widespread Economic Analysis for Individual Nutrient Standards Variances AND Guidelines for Determining if a Waste Water Treatment Facility Can Remain at a Previous General Variance Concentration”*.

3.0 Individual Nutrient Standards Variances

Montana law allows for the granting of nutrient standards variances based on the particular economic

and financial conditions of a permittee (§75-5-313 [1], MCA). Individual nutrient standards variances (“individual variances”) may be granted on a case-by-case basis because the attainment of the base numeric nutrient standards is precluded due to economic impacts, limits of technology, or both. In general, individual variances are intended for permittees who would have financial difficulties meeting even the general variance concentrations, and are seeking individual N and P permit limits tailored to their specific economic situation.

Unlike the general variances presented in **Section 2.0** above, individual variances may only be granted to a permittee after the permittee has made a demonstration to the Department of economic impacts, the limits of technology, or both (ARM 17.30XXX). The Department, in conjunction with the Nutrient Work Group, has developed an assessment process that must be completed by applicants seeking an individual variance. The assessment process is found in the Department guidance document *“Carrying out a Substantial and Widespread Economic Analysis for Individual Nutrient Standards Variances AND Guidelines for Determining if a Waste Water Treatment Facility Can Remain at a Previous General Variance Concentration”*.

A permittee, using the assessment process referred to above, must also demonstrate to the Department that there are no reasonable alternatives (including but not limited to trading, compliance schedules, reuse, recharge, and land application) that would allow compliance with the base numeric nutrient standards. If no reasonable alternatives exist, then an individual variance is justifiable and becomes effective and may be incorporated into a permit following the Department’s formal rule making process. Individual variances the Department may adopt in the future will be documented in **Table 12B-2** below.

Like general variances, the basis and justification for individual variances must be reviewed by the department every three years as part of the water quality standards triennial review. For most individual variances, the basis will be the economic status of the community, i.e., the demonstration of substantial and widespread economic impacts. At the triennial review the Department will consider if the basic economic status of a community granted an individual variance has changed. The same parameters used to justify the original individual variance will be considered; these are detailed in the guidance document *“Carrying out a Substantial and Widespread Economic Analysis for Individual Nutrient Standards Variances AND Guidelines for Determining if a Waste Water Treatment Facility Can Remain at a Previous General Variance Concentration”*. If new, low-cost nutrient removal technologies have become widely available, or if the economic status of the community has sharply improved, the basis of the variance may no longer be justified. In such cases the department will discuss with the permittee the options going forward, including but not limited to a permit compliance schedule, trading, reuse, recharge, land application, or a general variance.

Table 12B-2. Table for individual variances that may be adopted.

MPDES Number	Facility Name	Discharge Latitude	Discharge Longitude	Receiving Waterbody	Receiving Waterbody Classification	Long-term Average		Start Date	Sunset Date (maximum)	Review Schedule (year)	Review Outcome
						Total P (µg/L)	Total N (µg/L)				

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4.0 Endnotes

(1) Based on facility design flow.

(2) Falk, M.W., J.B. Neethling, and D.J. Reardon, 2011. Striking a Balance between Wastewater Treatment Nutrient Removal and Sustainability. Water Environment Research Foundation, document NUTR1R06n, IWA Publishing, London, UK.

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NUTRIENT STANDARDS RULES (version 7.3)

NEW RULE I: NUTRIENT STANDARDS VARIANCES

- (1) A person may apply to the department for a nutrient standards variance at any time following the board's adoption of base numeric nutrient standards.
- (2) An application for an individual variance must provide adequate demonstration that there are no reasonable alternatives that eliminate the need for a variance and that attainment of the base numeric nutrient standards is precluded due to economic impacts, the limits of technology, or both. If the demonstration relies upon economic impacts, the demonstration must be consistent with the guidelines developed by the department and the nutrient work group, as provided in 75-5-313(2), MCA.
- (3) The department shall review each application for an individual variance to determine whether a reasonable alternative, such as trading, a permit compliance schedule, a general variance, reuse, recharge, or land application would eliminate the need for an individual variance. If the department makes a preliminary finding that a reasonable alternative to approving an individual variance is available, the department shall consult with the applicant prior to making a final decision to approve or deny the individual variance.
- (4) If, after consultation with the applicant, the department determines that no reasonable alternative to an individual variance exists, the department must determine whether the information provided by the applicant in (2) adequately demonstrates that attaining the base numeric nutrient standards is not feasible. If the department finds that attaining the base numeric nutrient standards is not feasible, the department shall approve an individual variance, which will become effective and incorporated into the applicant's permit only after adoption by the department in a formal rulemaking proceeding.
- (5) An application for a general variance must provide information demonstrating that the wastewater treatment facility meets the requirements of 75-5-313(5)(b), MCA, or updated concentrations subsequently adopted by the department.
- (6) A permittee who has already received a general variance is not required to further treat the facility's discharge to an updated (lower) general variance concentration adopted by the department if it can be demonstrated that achieving the lower concentration would not result in net environmental improvement, or would not result in material progress towards attaining the base numeric nutrient standard, and would cause more environmental harm than remaining at the previous general variance concentration. The demonstration must be consistent with guidelines developed by the department and the nutrient work group.
 - (a) Permittees who have made a demonstration per (6) and are not required to treat their facility's discharge to the current general variance concentration(s) must begin to collect water quality data that can be used to determine if the status described in (6) remains true. Data collection must be consistent with guidelines developed by the department and the nutrient work group.
- (7) An approved TMDL that demonstrates that a wastewater treatment facility is an insignificant nutrient load to a receiving waterbody precludes the need for the facility's permittee to receive or maintain a nutrient standards variance.

17.30.602 DEFINITIONS In this subchapter the following terms have the meaning indicated below and are supplemental to the definitions given in 75-5-303, MCA:

(1) through (15) remain the same.

(16) "Limits of technology" means wastewater treatment processes for the removal of nitrogen and phosphorus compounds from wastewater that can achieve a

concentration of 70 micrograms of total phosphorus per liter and 4,000 micrograms of total nitrogen per liter.

(16) through (34) remain the same but are renumbered (17) through (35).

(35) (36) "Total nitrogen" means the total nitrogen concentration (as N) of unfiltered water. This may be determined by direct methods, or derived as the sum of the soluble (as N) and non-soluble (as N) nitrogen fractions. The filter used to separate the soluble and non-soluble fractions must be 0.45-µm sum of all nitrate, nitrite, ammonia, and organic nitrogen, as N, in an unfiltered water sample. Total nitrogen in a sample may also be determined by persulfate digestion, or as the sum of total kjeldahl nitrogen plus nitrate plus nitrite.

(36) (37) "Total phosphorus" means the total phosphorus concentration (as P) of unfiltered water sum of orthophosphates, polyphosphates, and organically bound phosphates, as P, in an unfiltered water sample. Total phosphorus may also be determined directly by persulfate digestion.

(37) through (40) remain the same but are renumbered (38) through (41).

(41) (42) "DEQ-7" means the department circular that is adopted and incorporated by reference in ARM 17.30.619 and is entitled "Montana Numeric Water Quality Standards." This circular establishes water quality standards for toxic, carcinogenic, bioconcentrating, nutrient, radioactive, and harmful parameters, and also establishes human health-based water quality standards for the following specific nutrients with toxic effects: nitrate, nitrate + nitrite, and nitrite.

(43) "DEQ-12" means the department circular that is adopted and incorporated by reference in ARM 17.30.619 and is entitled "Montana Base Numeric Nutrient Standards and Nutrient Standards Variances" This circular contains numeric water quality standards for total nitrogen and total phosphorus in surface waters and also contains variances from those standards.

17.30.619 INCORPORATIONS BY REFERENCE (1) The board adopts and incorporates by reference the following state and federal requirements and procedures as part of Montana's surface water quality standards:

(a) Department Circular DEQ-12, entitled "Montana Base Numeric Nutrient Standards and Nutrient Standards Variances," Part A (September 2012 edition), which establishes numeric water quality standards for total nitrogen and total phosphorus in surface waters;

(a)-(b) Department Circular DEQ-7, entitled "Montana Numeric Water Quality Standards" (August 2010 edition), which establishes water quality standards for toxic, carcinogenic, bioconcentrating, nutrient, and harmful parameters and also establishes human health-based water quality standards for the following specific nutrients with toxic effects: nitrate; nitrate + nitrite; and nitrite;

(b) through (f) remain the same but are renumbered (c) through (g).

(2) The department adopts and incorporates by reference the following as part of Montana's surface water quality standards:

Department Circular DEQ-12, entitled "Montana Base Numeric Nutrient Standards and Nutrient Standards Variances," Part B (September 2012 edition), which establishes variances from the numeric water quality standards for total nitrogen and total phosphorus in surface waters adopted by the board in Part A of Department Circular DEQ-12.

(2) remains the same but is renumbered (3).

17.30.622 A-1 CLASSIFICATION STANDARDS (1) through (2) remain the same.

(3) No person may violate the following specific water quality standards for waters classified A-1:

(a) through (h) remain the same.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards contained in department Circular DEQ-7 and, when applicable, the base numeric nutrient standards or nutrient standards variances in DEQ-12 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) through (k) remain the same.

17.30.623 B-1 CLASSIFICATION STANDARDS (1) remains the same.

(2) No person may violate the following specific water quality standards for waters classified B-1:

(a) through (h) remain the same.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards specified in department Circular DEQ-7 and, when applicable, the base numeric nutrient standards or nutrient standards variances in DEQ-12 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) through (k) remain the same.

17.30.624 B-2 CLASSIFICATION STANDARDS (1) remains the same.

(2) No person may violate the following specific water quality standards for waters classified B-2:

(a) through (h) remain the same.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards specified in department Circular DEQ-7 and, when applicable, the base numeric nutrient standards or nutrient standards variances in DEQ-12 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) through (k) remain the same.

17.30.625 B-3 CLASSIFICATION STANDARDS (1) remains the same.

(2) No person may violate the following specific water quality standards for waters classified B-3:

(a) through (h) remain the same.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards specified in department Circular DEQ-7 and, when applicable, the base numeric nutrient standards or nutrient standards variances in DEQ-12 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) through (k) remain the same.

17.30.626 C-1 CLASSIFICATION STANDARDS (1) remains the same.

(2) No person may violate the following specific water quality standards for waters classified C-1:

(a) through (h) remain the same.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards specified in department Circular DEQ-7 and, when applicable, the base numeric nutrient standards or nutrient standards variances in DEQ-12 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) through (k) remain the same.

17.30.627 C-2 CLASSIFICATION STANDARDS (1) remains the same.

(2) No person may violate the following specific water quality standards for waters classified C-2:

(a) through (h) remains the same.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards specified in department Circular DEQ-7 and, when applicable, the base numeric nutrient standards or nutrient standards variances in DEQ-12 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) through (k) remain the same.

17.30.628 I CLASSIFICATION STANDARDS (1) remains the same.

(2) No person may violate the following specific water quality standards for waters classified I:

(a) through (i) remain the same.

(j) Beneficial uses are considered supported when the concentrations of toxic, carcinogenic, or harmful parameters in these waters do not exceed the applicable standards specified in department Circular DEQ-7 and DEQ-12 when stream flows equal or exceed the flows specified in ARM 17.30.635(4) or, alternatively, for aquatic life when site-specific criteria are adopted using the procedures given in 75-5-310, MCA. The limits shall be used as water quality standards for the affected waters and as the basis for permit limits instead of the applicable standards in department Circular DEQ-7.

(k) Limits for toxic, carcinogenic, or harmful parameters in new discharge permits issued pursuant to the MPDES rules (ARM Title 17, chapter 30, subchapter 13) are the larger of either the applicable standards specified in department Circular DEQ-7 and, when applicable, the base numeric nutrient standards or nutrient standards variances in DEQ-12, site-specific standards or one-half of the mean in-stream concentrations immediately upstream of the discharge point.

17.30.629 C-3 CLASSIFICATION STANDARDS (1) remains the same.

(2) No person may violate the following specific water quality standards for waters classified C-3:

(a) through (h) remain the same.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards specified in department Circular DEQ-7 and, when applicable, the base numeric nutrient standards or nutrient standards variances in DEQ-12 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) through (k) remain the same.

17.30.631 NUMERIC ALGAL BIOMASS AND NUTRIENT STANDARDS

~~(1) No person may violate the numeric water quality standards identified below.~~

~~(2) The numeric nutrient and standing crop of benthic algae water quality standards for the mainstem Clark Fork River from below the Warm Springs Creek confluence (N46°11'17", W112°46'03") to the confluence with the Flathead River (N47°21'45", W114°46'43") are as follows:~~

~~(a) In the mainstem Clark Fork River from below the Warm Springs Creek confluence (N46°11'17", W112°46'03") to the confluence with the Blackfoot River (N46°52'19", W113°53'35") the numeric water quality standards for Total Nitrogen, Total Phosphorus, and benthic algal chlorophyll a, applicable from June 21 to September 21, are as follows:~~

(i) Parameter	Concentration
Total Phosphorus as P	20 µg/L
Total Nitrogen as N	300 µg/L
(ii) Parameter	Density
(Summer mean) - Benthic	100 mg/square meter
algal chlorophyll a	
(Maximum) - Benthic	150 mg/square meter
algal chlorophyll a	

~~(b) In the Clark Fork River from the confluence with the Blackfoot River (N46°52'19", W113°53'35") to the confluence with the Flathead River (N47°21'45", W114°46'43") the numeric water quality standards for Total Nitrogen, Total Phosphorus, and benthic algal chlorophyll a, applicable from June 21 to September 21, are as follows:~~

(i) Parameter	Concentration
Total Phosphorus as P	39 µg/L
Total Nitrogen as N	300 µg/L
(ii) Parameter	Density
(Summer mean) - Benthic	100 mg/square meter
algal chlorophyll a	
(Maximum) - Benthic	150 mg/square meter
algal chlorophyll a	

17.30.635 GENERAL TREATMENT STANDARDS (1) through (3) remain the same.

(4) For design of disposal systems, stream flow dilution requirements must be based on the minimum consecutive seven-day average flow which may be expected to occur on the average of once in 10 years. When dilution flows are less than the above design flow at a point discharge, the discharge is to be governed by the permit conditions developed for the discharge through the waste discharge permit program. If the flow records on an affected surface water are insufficient to calculate a 10-year seven-day low flow, the department shall determine an acceptable stream flow for disposal system design. The department shall determine the acceptable stream flow for disposal system design for controlling nitrogen and phosphorus concentrations. For total nitrogen and total phosphorus, the stream flow dilution requirements must be based on the seasonal 14Q5, which is the lowest average 14 consecutive day low flow, occurring from July through October, with an average recurrence frequency of once in 5 years.

17.30.702 DEFINITIONS The following definitions, in addition to those in 75-5-103, MCA, apply throughout this subchapter (Note: 75-5-103, MCA, includes definitions for "base numeric nutrient standards," "degradation," "existing uses," "high quality waters," "mixing zone," and "parameter"):

(1) through (16) remain the same.

(17) "Nutrients" means total inorganic phosphorus and total inorganic nitrogen.

(18) through (21) remain unchanged but are renumbered (17) through (20).

(22) (21) "Reporting values (RRV)" means the detection level that must be achieved in reporting surface water or ground water monitoring or compliance data to the department unless otherwise specified in a permit, approval, or authorization issued by the department. The RRV is the department's best determination of a level of analysis that can be achieved by the majority of commercial, university, or governmental laboratories using EPA approved methods or methods approved by the department. The RRV is listed in Circular DEQ-7, Part A of Circular DEQ-12, and the definition of total inorganic phosphorus.

(23) remains the same but is renumbered (22).

(23) "Total inorganic phosphorus" means the sum of all orthophosphates, as P, in an unfiltered water sample. Total inorganic phosphorus may also be determined by direct colorimetry. The RRV for total inorganic phosphorus is 1 microgram per liter.

(24) "Total nitrogen" means the sum of all nitrate, nitrite, ammonia, and organic nitrogen, as N, in an unfiltered water sample. Total nitrogen in a sample may also be determined by persulfate digestion, or as the sum of total kjeldahl nitrogen plus nitrate plus nitrite.

(25) "Total phosphorus" means the sum of orthophosphates, polyphosphates, and organically bound phosphates, as P, in an unfiltered water sample. Total phosphorus may also be determined directly by persulfate digestion.

(24) through (25) remain the same but are renumbered (26) and (27).

(26) (28) The board adopts and incorporates by reference:

(a) Department Circular DEQ-12, entitled "Montana Base Numeric Nutrient Standards and Nutrient Standards Variances," Part A (March 2012 edition), which establishes numeric water quality standards for total nitrogen and total phosphorus in surface waters.

(a) (b) Department Circular DEQ-7, entitled "Montana Numeric Water Quality Standards" (August 2010 edition), which establishes water quality standards for toxic, carcinogenic, bioconcentrating, nutrient, radioactive, and harmful parameters and also establishes human health-based water quality standards for the following specific nutrients with toxic effects: nitrate; nitrate + nitrite, and nitrite;

(b) through (d) remain the same but are renumbered (c) through (e).

17.30.715 CRITERIA FOR DETERMINING NONSIGNIFICANT CHANGES IN WATER QUALITY (1) The following criteria will be used to determine whether certain activities or classes of activities will result in nonsignificant changes in existing water quality due to their low potential to affect human health or the environment. These criteria consider the quantity and strength of the pollutant, the length of time the changes will occur, and the character of the pollutant. Except as provided in (2), changes in existing surface or ground water quality resulting from the activities that meet all the criteria listed below are nonsignificant, and are not required to undergo review under 75-5-303, MCA:

(a) activities that would increase or decrease the mean monthly flow of a surface water by less than 15% or the seven-day 10 year low flow by less than 10%;

(b) discharges containing carcinogenic parameters or parameters with a bioconcentration factor greater than 300 at concentrations less than or equal to the concentrations of those parameters in the receiving water;

(c) discharges containing toxic parameters or nutrients, except as specified in (1)(d) and (e), which will not cause changes that equal or exceed the trigger values in department Circular DEQ-7. Whenever the change exceeds the trigger value, or if nitrogen and phosphorous concentrations in Circular DEQ-12 are being considered, the change is not significant if the resulting concentration outside of a mixing zone designated by the department does not exceed 15% of the lowest applicable standard;

**HOW WILL MY PERMIT CHANGE AS DEQ UPDATES CONCENTRATION REQUIREMENTS FOR THE
GENERAL VARIANCE CATEGORIES? Version 4**

START. Circa 2016, facilities are:

1. Meeting standards (or have compliance schedule to do so)
2. Meeting General Variance (or have compliance schedule to do so)
3. Meeting individual Variance (or have compliance schedule to do so)

3-Year Review: For each category, DEQ evaluates if more cost-effective and efficient phosphorus and nitrogen removal technologies are available that can be applied at the statewide scale (**ENDNOTE 1**)

DEQ reviews the General Variance categories every 3 years

Does 3-year review indicate there are more cost-effective & efficient nutrient-removal technologies for a category?

NO

YES

Carry forward to next 3-year review

Apply for an Individual Variance

(ENDNOTE 2)

Variance no longer required

Remain at Previous General Variance Treatment Level. Discharger is not required to upgrade facility beyond the *previous* General Variance level. Situation in the watershed must be monitored over time to see if statement 5 in previous box remains true. (If this was DEQ's first change to the Gen. Variance level since 2016, the discharger would remain at 2016 level.)

(ENDNOTE 4)

DEQ updates General Variance Treatment level(s) for one or more categories.

Am I required to meet the updated General Variance treatment levels? YES, UNLESS:

- 1) It's too costly
- 2) Facility moves to a zero waste load allocation (non-discharge in summer)
- 3) Upstream assimilative capacity allows facility to remain at current treatment level because standard is met
- 4) Approved TMDL concluded that facility is an insignificant nutrient loading source (**ENDNOTE 3**)
- 5) Upgrade to new General Variance treatment level would not result in a net environmental improvement and progress towards attaining the standard

ENDNOTES

(1) Further details regarding what will be considered for the triennial review are in Section 2.0, Circular DEQ-12 Part B.

(2) Rules regarding what is required to receive an individual variance are in NEW RULE I (2)(3) and (4). Further information is found in Section 3.0, Circular DEQ-12 Part B, and in Sections 1.0 through 3.0 in the guidance document *“Carrying out a Substantial and Widespread Economic Analysis for Individual Nutrient Standards Variances AND Guidelines for Determining if a Waste Water Treatment Facility Can Remain at a Previous General Variance Concentration”*.

(3) Rules pertaining to a determination in a TMDL that a facility is an insignificant nutrient load are found in NEW RULE I (7).

(4) Rules regarding what is required to remain at a previous general-variance concentration are in NEW RULE I (6) and (6a). Further information can be found in Section 2.2, Circular DEQ-12 Part B, and in Section 4.0 of the guidance document *“Carrying out a Substantial and Widespread Economic Analysis for Individual Nutrient Standards Variances AND Guidelines for Determining if a Waste Water Treatment Facility Can Remain at a Previous General Variance Concentration”*.